condensation heat is developed in the atmosphere, which has the effect of raising the temperature of the higher air above what it would have been had the rate of decrease continued uniformly from the earth upwards.

There are several instances of a second or even a third *sudden* fall in the dew-point, but any corresponding variation in the temperature is not so clearly exhibited, probably owing to the *total* amount of moisture in the air being, at low temperatures, so very small that even a considerable change in its *relative* amount would produce but a small thermal effect.

As the existence of the disturbance in the regular progression of temperature now stated rendered it necessary, in order to arrive at any approximate value of the normal rate of diminution with height, to make abstraction of the portion affected by the disturbing cause, each series was divided into two *sections*, the first comprising the space below the stratum in which the irregularity existed, and the second commencing from the point where the regular diminution of temperature was resumed. It was then found that the rate of diminution was nearly uniform within each *section*, but that it was somewhat greater in the lower than in the upper sections.

On taking a mean of both sections for each series, giving each section a value corresponding to its extent, it is found that the number of feet of height corresponding to a fall of one degree Fahrenheit is—

On August 17	292·0 feet.
August 26	290·7 ,,
October 21	291·4 ,,
November 10	312·0 ,,

The first three values being remarkably coincident, and the last differing from them by about $\frac{1}{15}$th of the whole.

The air collected in the ascents was analysed by Dr. Miller; he states that "the specimens of air do not differ in any important amount from that at the earth at the same time, but contain a trifle less oxygen. All of them contained a trace of carbonic acid, but the quantity was too small for accurate measurement upon the small amount of air collected."

June 2, 1853.

The EARL OF ROSSE, President, in the Chair.

The Annual General Meeting for the Election of Fellows was held.

The Statutes respecting the election of Fellows having been read, Admiral Sir Francis Beaufort, and James Walker, Esq., were, with the consent of the Society, appointed Scrutators to assist the Secretaries in examining the lists.

The votes of the Fellows present having been collected, the following Gentlemen were declared duly elected :—

James Apjohn, M.D.
John George Appold, Esq.
John Allan Broun, Esq.
Antoine Jean François Claudet, Esq.
Edward J. Cooper, Esq.
E. Frankland, Esq.
John Hall Gladstone, Esq.
Commander Inglefield, R.N.
Joseph Beete Jukes, Esq.
Robert MacAndrew, Esq.
Charles Manby, Esq.
Joseph Prestwich, Esq.
William John Macquorn Rankine, Esq.
William Wilson Saunders, Esq.
William Spottiswoode, Esq.
Count P. de Strzelecki.

The Society then adjourned.

June 9, 1853.

The EARL OF ROSSE, President, in the Chair.

The following Gentlemen were admitted into the Society :—

John George Appold, Esq.
Antoine François Jean Claudet, Esq.
Edward Frankland, Esq., Ph.D.
John Hall Gladstone, Esq., Ph.D.
Robert MacAndrew, Esq.
Charles Manby, Esq.
Count Strzelecki.

The following papers were read :—

1. "Further Experiments and Observations on the Properties of Light." By Lord Brougham, F.R.S., Member of the Institute of France. Received May 9, 1853.

1. The author considers that Sir Isaac Newton's experiments to prove that the fringes formed by inflexion and bordering the shadows of all bodies, are of different breadths when formed by the homogeneous rays of different kinds, are the foundation of his theory, and would be perfectly conclusive if the different rays were equally bent out of their course by inflexion, for in that case the line joining the centres of the fringes on opposite sides of the shadow being, as he found them, of different lengths, the fringes must be of different breadths. He found that line to be $\frac{1}{37\frac{1}{2}}$ inch in the red, $\frac{1}{46}$ in the violet of the nearest fringe; $\frac{1}{22}$ in the red, $\frac{1}{27}$ in the violet of the second fringe; and these proportions he found to be the same at all distances of the chart from the hair. But if the rays are of different flexibility, if the red, for example, is bent to a greater distance from its course than the violet, the experiment becomes wholly inconclusive; and the line joining the centres may be greater in the red than in the violet, although the breadths of the two fringes are equal, or even though the violet fringe may be broader than the red.

2. A variety of experiments are adduced in the paper to show that this property of different flexibility exists, which Sir I. Newton had

not remarked. These experiments are either made with two bodies acting jointly on the rays, or with a single body so acting.

3. When made with two bodies, as sharp edges, these edges must be perfectly parallel, and when placed in the axis of the prismatic spectrum they form fringes more distant in the red than in any other part; least distant in the violet. The fringes are both broadest in the least refrangible rays and most removed; narrowest and least removed in the most refrangible. They incline from the red towards the violet.

4. The same experiment is easily made with a lamp or candle, placing a prism between the flame and the edges. This renders that exact parallelism of the edges which is required in the experiment with the spectrum, comparatively immaterial; because a considerable inclination of the edges, as at an angle of half a degree or more, does not affect the action on the rays in the very small space through which they pass by the edges.

5. With a single edge, or other body as a hair, the same difference in the position, as well as in the breadth of the fringes, is found to be observable, though not so manifestly as when two act together on the light. The manner of making the observation most conveniently is pointed out.

6. These experiments are varied so as to show the various distensions of the disc of a flame subjected to flexion between two edges, according as we regard the various portions of the flame's spectrum when seen by the prism. The red part is broadest, and when the near approach of the edges to each other divides the disc into two with a dark interval between them, that interval is the broadest in the least refrangible rays.

7. The experiments are further varied by using coloured glass instead of refracting with a prism.

8. The same phenomena are found to exist in all the other cases of flexion as where it is combined with reflexion by the action of specula, or by the effect of striated surfaces. There is always the same difference in the effects produced by the different kinds of homogeneous light.

9. The same phenomena are not so easily observed in the internal fringes, or those of the shadow; but the dark gray line in the axis of the shadow, having a line of deep black on each side, is found to vary in breadth and position in the different parts of its length corresponding to the colours of the spectrum, when a needle or other small body is placed in that spectrum.

10. The angle of inflexion is shown to be obtained by taking the distance at which the internal fringes begin to appear; and the proportion of this angle in the red to the same angle in the violet is ascertained. The deflexion (as deduced from Sir I. Newton's experiments) is much greater than inflexion appears to be. He had not observed the internal fringes of Grimaldi, to whom, however, he refers.

11. The author states that the property in question, the different flexibility of light, coexists with the other property, whatever it may

be, which disposes the different rays in fringes of different breadths; but he considers that the two properties are wholly independent of each other.

12. He thinks there is reason to believe that the dark intervals between the fringes made in white light are only the dark tint of the adjoining fringes, of which the red of one runs into the violet of the other. The greatest care in repeating Sir I. Newton's experiment, with the same distances and sizes both of the body and the beam, leaves little or no doubt of the fringes running into each other. In homogeneous light it is otherwise; and there appear in that case to be the intervals, as might be expected from the different flexibility of the different rays.

13. The fringes made in homogeneous light have a considerable admixture of colours from the scattered rays; so have the small spectra by refraction made when a second prism is placed behind a small hole in the screen, through which hole the rays of the spectrum made by the first prism are successively passed.

14. The phenomena of flexion by bodies placed in the portion of the spectrum near the prism, and therefore white, are stated to be not easily accounted for in any received theory.

15. The Newtonian hypothesis of the different breadths of the fringes being caused by the action of flexion extending to different distances over the different rays, is stated to be insufficient to account for it, and also to account for the different colours in the fringes to be made by white light. It is considered that the different flexibility will account for the latter, but not for the different breadths of the fringes, without another hypothesis, namely, the different ratio of the force to the distance from the bending body, in different rays.

16. The entire difference of flexion and refraction is shown from the different breadths of the fringes, and from their formation upon any possible hypothesis being shown to have nothing similar or analogous in the phenomena of refraction, though the different flexibility is precisely similar to the different refrangibility, only applicable inversely to the different rays.

17. The relation of the doctrine of interference to the phenomena of flexion is considered; and it is shown that certain of these phenomena are at variance with the doctrine. This is particularly exemplified in the case of the phenomena observed where bodies acting on light are not placed directly opposite to each other, but one behind the other.

18. The same phenomena are adduced to disprove M. Fresnel's hypothesis, that the phenomena of flexion (termed by him diffraction) depend entirely on the size of the aperture through which the light enters. Three experiments are adduced in disproof of this; the *first* made on the aperture when the edges are directly opposite each other; the *second*, when the edges are moved to different distances from each other on a line exactly parallel to the rays; the *third*, when the edges are moved on a line at any inclination to the rays. In both the *second* and *third* experiment, the vertical distance of the edges (*i. e.* the aperture) being the same, the breadth as well as the

separation of the fringes is found to vary with the distance of the edges from each other horizontally, or in the direction of the rays.

2. "Researches on the distribution of the Blood-vessels, &c. in the Lungs." By James Newton Heale, M.D. Communicated by J. Hodgson, Esq., F.R.S. Received May 20, 1853.

After referring to the discrepancies in the opinions entertained by anatomical writers both with respect to the distribution and to the functions of the blood-vessels with which the lungs are supplied, the author states the leading features in which the observations made by him differ from those which have hitherto been published. He finds that:—

1st. The pulmonary artery makes no anastomosis whatever with any other artery, nor do its own branches anastomose together; its branches go direct to the air-cells, and are there distributed, and terminate as arteries; none of its branches go to any other tissues of the lungs besides the air-cells, except some few which perforate the sub-pleural cellular tissue, and are distributed to the pleura; some of these also cross the posterior mediastinum beneath the pleura, and reach the thoracic pleura.

2ndly. The bronchial (so called) arteries have their own special distribution, which will be described further on; they do *not* supply, in the smallest degree, any portion of the *bronchial mucous membrane*, and they form no sort of communication, either with the pulmonary arteries or veins, except as supplying their cellular sheaths, and therefore in all probability furnishing their *vasa vasorum*.

3rdly. The bronchial mucous membrane is very freely supplied with an exceedingly vascular plexus, of a peculiar and very characteristic description, which is found to ramify in every part of the bronchial membrane, and which may be traced even as high as the trachea. The whole of this plexus is derived from the *air-cells*, and terminates ultimately by means of minute radicles, which form trunks and join the *pulmonary veins*. No trace whatever of any branches of the pulmonary artery, previous to this becoming capillary in the air-cells, is found in any part of the bronchial membrane.

4thly. The blood being brought to the air-cells by means of the pulmonary artery, is wholly returned by the pulmonary veins; but the trunks of these latter are formed by the junction of two distinct sets of radicles, namely, one set which comprises those which are formed from the perimeters of the air-cells (*i. e.* that part of the air-cell which is distant from the bronchial tube to which it is connected), and which at once form trunks which are visible on the surface of the lungs, and of all the lobules, and especially of the surfaces which adjoin the interlobular fissures; the other set consist of those which are derived from the bases of the air-cells, and which supply the bronchial membrane, and then terminate by radicles forming trunks, which join the before-mentioned set of pulmonary veins; and from these conjoined, the larger venous trunks are derived, which at length accompany the larger bronchi, and the pulmonary arteries, and which finally terminate in the left auricle of the heart; so that